56.—Dolabella ecaudata.

Dolabella ecaudata, Rang. Hist. Nat. des Aplys. pl. 2, p. 47, No. 2.

Hab. Home Islands, North East Australia.

57.—Aplysia sp. ?

Hab. Three miles south of Fitzroy Island, North East Australia, found on floating weeds.

On some Australian Species of *Trochocochlea*, by the Rev. J. E. Tenison Woods, F.G.S., &c., Corr. Mem. L.S., N.S.W.

The genus *Trochocochlea* was first proposed by Klein, in 1753 (*Tentamen methodi ostracologicæ, L.B.*, 1753, p. 42, *ita. Hermannsen Indicis*, p. 616), for a genus which cannot now be recognized, as it includes several genera, and includes families. He derived the name from τροχός, a wheel, and χοχλὶας, a helix. The name has been revived by Messrs. H. and A. Adams (*Genera*), and is by them defined thus :—Shell conoidal, imperforate in the adult; whorls smooth or transversely lirate, the last rounded at the periphery; aperture nearly rhomboidal; columella thick and rounded, ending in a slightly prominent tubercle. The same genus has been named *Trochius* by Leach, *Gibbium* by Gray, *Osilinus* Phil., *Labio*, Gray, not Oken, *Melagraphia*, Stentz. Messrs. Adams give a list of twenty species, but they do not include our *T. Australis*, or, as it is better known, *T. striolata*. If the genus is to be maintained it should be added that the shell is nacreous, and the operculum, being horny, multispiral, and central; the mantle with small fringes and six to eight tentacular appendages. The odontophore is trochoid, or that which is generally seen in the family, namely, one prominent central tooth, three or four long, curved, lanceolate laterals, and an arcuate comb of uncini.

We have three well-known forms round the Southern Coasts of Australia and all Tasmania, *T. constricta*, *T. tæniata*, and *T. australis*. The two first are doubtfully separated from one

another, and I believe are only varieties; the third named has a host of synonyms. *T. constricta* is mainly distinguished by its round keels. It is marked in Port Jackson with broad reddish brown zigzag bands on a dull yellow ground; raised and very prominent rounded keels, and somewhat corrugated fine transverse and oblique striæ. It is this form of the shell which Messrs. Quoy and Gaimard describe as *T. tæniata*. The other variety which more strictly deserves the name of *tæniata*, has obsolete keels, and the transverse striæ are less pronounced; the shell is more oblique and conical, and marked with numerous zebra-like fine zigzag black, brown, reddish, or green lines; the name *T. tæniata* is, however, clearly a synonym for *T. constricta*. If it be applied to the variety with the fine stripes it is not the one to which Messrs. Quoy gave the name. But I doubt whether there is any use in preserving the name at all. As far as my observations go no permanent mark of distinction between the two varieties can be relied on. There seem to be some differences in the animals, but in the same variety they differ from one another to the same extent. There is no difference in the odontophore or lingual ribbon, which I shall describe further on.

I now give some history of the synonomy of the species :—

Trochus Tæniatus, Quoy and Gaimard, *Voyage de l'Astro.*, *vol.* 3, *p.* 251, *pl.* 63, *figs.* 15, front view 16, back view 17, animal.

This figure is the largest of the genus now recognised as *Trochocochlea*. It appears to me like a "striped" *Trochocochlea constricta*, but I have only met with specimens thus striped on the N. S. Wales coasts. The following is the text :— *T. t. ovata conoidea, imperforata, crassa, basi dilatata, rotunda, transverse carinata, lutea, vittis longitudinalibus undulatis subrubris aut fuscis ornata, labro albo, intus sulcato, peristomata tæniata, columella lævi.*

I translate the following observations :— "It is astonishing that this remarkable species, so common on the rocks about Port Jackson, has never before been figured. It is solid conical, elevated, dilated and rounded at the base, strongly keeled on three whorls, which are rather rugged. The aperture is semi-circular, white, slightly nacreous and grooved; the peristome forms a

kind of distinct band which is not nacreous, greenish and spotted with brown; the columella is flattened and without a tooth. This *Trochus* is yellowish, or whitish, with wide longitudinal wavy undulating stripes, reddish or brownish in colour. They extend the whole length of the shell, and are taken up at each whorl from the suture. The colour of the animals, eyes, tentacles, under part of the foot, laminated fringes and eight tentacles is pale greenish; the mouth is black above and yellow at the point, capable of much dilatation, and fringed below; the foot is black laterally with a transverse green band; the operculum is round and somewhat large. This *Trochus* is found in company with *T. multicarinata*, with which it must not be confounded. Its conical form distinguish it more easily than its stripes, for there are varieties of *T. multicarinata* which have also reddish stripes. Length, 1 inch 2 lines; diameter of base, 11½ lines."

The plate accompanying this description is a large *Trochocochlea constricta*, with brown oblique bands very plainly marked on a yellow ground.

The authors then go on to describe *T. multicarinata*, which I think will evidently appear from their description to be no more than a variety—if indeed a variety—of *Trochocochlea constricta* of Lamarck, described in another place (*Anim. s. verteb.*, *tom.* 7, *p.* 36, *No.* 15) as *Monodonta multicarinata*. First they give L.'s diagnosis, then add—"There are varieties of shape and colour in this shell which would make it pass insensibly into the preceding species, although the extremes differ. But we do not hesitate to consider it as a species whose type is shorter, more circular and dilated at the base, with a sharper spire than the striped *Trochus*. Its keels, which very regularly amount to seven on the last whorl, are separated by deep channels. Its aperture is semi-circular, white, with only two or three keels, and on its limb (outer lip?) which is smooth, a black line. The shell is dull yellowish, and sometimes covered with red or brown zigzag flames, then it resembles the preceding. The animal has long pointed greenish tentacles, dotted with black; the stalks of the eyes are triangular, black, like the sides of the feet and the

upper part of the mouth," &c., &c. The dimensions are then given as 8 lines long and 7 lines for the diameter of the base. These dimensions do not agree with Lamarck's, who in the place quoted gives a base of $10\frac{3}{4}$ lines, which agrees more with what we know of *T. constricta*.

I now add my own notes of *Trochocochlea constricta* from Tasmanian specimens, and mostly from South Tasmania (Southport), where the species attains its largest size. Shell oblique, obtusely conial, dull or faint pink when fresh from the water, and yellowish when dry, and having a coarse chalky appearance; whorls four to five, tumidly convex, furnished with seven to eight conspicuous rounded keels on the body whorl, and two on the others (the one nearest the suture being the largest and most prominent); the whole shell marked with fine oblique lines of growth; mouth, sub-auricular; outer lip, double; outer margin, *calcareous pinkish*; grooved at the keels, where it is often stained a deep black, or sometimes the whole lip is black; throat nacreous, silvery, with little colour, with a few well-defined and prominent liræ; columella, pure white, ending in a blunt tubercle; enamel slightly spread over the base, on which also three or four ribs are marked with spiral black lines.

I now subjoin my notes of the striped variety from the same locality. The shell is always smaller. It has less distinct and smoother keels of equal size, at most eight, on body whorl, and sometimes less. The colour is pinkish, or even reddish, with zigzag longitudinal flames of blue black, which in very dry and old shells become a reddish brown or green; outer lip generally margined with black, throat of darker nacre, grooves of keel scarcely perceptible on outer lip, and liræ of the throat seldom visible; columella, brownish; tubercle almost obsolete. The liræ of the throat are always present in the N.S.W. specimens.

The differences between the animals seem to consist first in the colour; *T. constricta* is almost black, the base of the foot being neutral tint, while *T. tæniata* is pale green and olive, with a little black at the sides of the foot. Both have the mouth fringed, but

T. c. has the eight filiaments at equal distances along the sides, and *T. t.* has four at each side close together and posterior. The tentacles are conspicuously celiated in *T. c.*, but with fewer hairs in *T. t.* The following are my notes on the odontophore of *T. c.* (lingual ribbon) as seen with a binocular, $\frac{1}{2}$ inch objective and reflected light:— One central broad quadrate tooth with semicircular edge; laterals five on each side, long, linear, curved with broad rounded edges; they are close together and increase in size towards the margin. The laterals are flanked by a close series of uncini, which are disposed in combs curved spirally, and appear like a rope with close strands; the latter is a feature common to all the *Trochidæ*, but here the uncini are longest in the centre of the comb. The plates of the teeth are very peculiar, the central one spreading like a broad rhomboid with a narrower square base, which is plainly seen through the transparent substance. The laterals have also a plate which overlaps the next succeeding; the transverse series is a curved line. The odontophore of *T. c.* was in all respects similar.

I come now to Quoy and Gaimard's *Trochus striolatus*, which goes by the name of *Trochocochlea striolata* and *T. concamerata*, but which was formerly, I believe, described by Lamarck as *Monodonta australis* (*Anim. s. vert.*, *vol.* 7, *p.* 35, *No.* 11) Chemnitz. Its synonomy I shall notice presently. Quoy and G. thus describe it:—"*T. t.*, *ovato-conoidea*, *imperforata*, *solida*, *transversim sulcata*, *nigricante*, *lineolis luteis longitud*, *ornata*, *apertura semicirculari*, *alba*, *fauce angusta*. This *Trochus*," they continue, "is round, slightly globose and transversely grooved. Its aperture is semi-circular, of a white nacre, and bounded by a double lip; its columella is slightly bidentate; its colour is a deep black, agreeably chequered with yellow in very fine lines lengthwise, and like spots on each groove. It has some relation to the strawberry *Monodonta* of Lamarck. Its aperture is different, its ribs more marked, closer together, and its line of spots more regular. The animal has villous tentacles, brown and clear, the eye stalks thick; tentacles, as well as the lateral fringes of the front green, with eight filiaments of the same

colour; the foot is yellowish-white below, black above, as also the mouth, which, however, is greenish near the mouth. *Hab.* Sydney, Port Jackson. Height and diameter of the base, 9 lines."

I find the same shell discribed thus, by Angas, in the Zool. Proc., for 1867, p. 216:—"No. 193. *Trochocochlea concomerata. Mondonta* c. Gray, *Wood's Index. Test. Suppl. pl.* 6, *fig.* 35. Faintly ridged, and painted with irregular wavy longitudinal lines of yellow on a black ground. *L. (sic.*, misprint for T. ?) *striolatus* of Quoy, from Tasmania and S. A., is much more depressed, and has a tesselated style of painting, although regarded as a synonym by Mr. Hanley in his edition of Wood's '*Index.*' Same locality as preceding. Long, 1 inch, 4 lines."

Yet, I am afraid we must uphold Hanley's ruling. In the first place, as we have seen Messrs. Quoy, and G. distinctly state that they got their specimens from Port Jackson, and not from Tasmania. Next the Tasmanian specimens in some instances answer to Mr. Angas's description of them, and sometimes not. The truth is that the shell is very variable. It is without exception, the commonest shell in Tasmania. Turn over any flat stone at low water, and the under side will be found covered with it, of almost every size, shape, and colour, within the limits of the shell's character. I have seen some specimens more than an inch in diameter, some almost conical, some depressedly turbinate, some white, with green spots, some black and yellow on diagonal lines, and some dull olive, with few yellow spots.

I now subjoin what I believe to be the synonomy of the species:—

Trochocochlea australis, Favanne, Conch., pl. 18, *fig. A* 1; *Le Ratelier, Chemn. Conch., tome* 11, *tab.* 196, *fig.* 1890.

Monodonta australis, Lamk., vol. 7, *p.* 35, *No.* 11.

T. concamerata, Gray, Wood's Index, Test. Suppl., pl. 6.

T. striolatus, Quoy and G., loc. cit. Angas, loc. cit.

In the *Encycl. Meth. Hist. Nat. des Vers, tome* 3, *p.* 1081, we find the following notice of the shell by Deshayes:—"This

shell constitutes a very distinct species. Its form brings it near certain Turbos. It is ovately conical, sub-globose, spire somewhat exsert obtuse, whorls 5-6, convex, suture simple, shallow. Last whorl very large, globose, very convex below, and obtuse at the periphery. Surface entirely grooved transversely, grooves shallow, slightly rounded, simple and never granulose, those beneath the last whorl narrower than the others. Aperture small, and somewhat like *Trochus labio*. Outer lip very thick, divided into two; interior clear white, with rather deep transverse grooves. The columella is very thick, *with a wide exterior surface*, obscurely shagreened at the end. The sinus of the middle deep; the tooth less prominent, and not rough, groove separating it from the outer lip, less deep than in *T. labio*. Colour somewhat variable, sometimes on a reddish, sometimes on greenish ground. The transverse grooves are ornamented with square white spots. Shell very thick and solid, rather rare in collections. Found in the seas of New Holland. Diam. 34, Alt. 36 mil.

I have marked with italics a distinctive feature of the columella, which is also concave.

I may remark that old and very dry specimens of dead shells have the reddish ground here referred to. I should say that the specimens came from the north of Port Jackson.

T. porcata, A , Ad. This shell is quoted by Angas, (*Proc. Zool. Soc.*, 1867, *p.* 216, *No.* 191), as a *Trochocochlea*, of which he gives the following diagnosis :— "The whorls are strongly carinate, and ornamented with narrow rose-coloured stripes, longitudinally. It is equally common with the foregoing species (*T. tæniata*). Length, 11 lines."

But this description does not correspond with the original diagnosis of Adams, (*P. Z. S.*, 1851, *Monograph of Trochidæ*, *p.* 179, *genus*, 15, *Labio*, *No.* 22), which is as follows :—"*Labio test ovato-conoidea, imperforata, fusca, albo reticulata; anfr, convexis transverse carinatis ; carinis numerosis, elevatis, distantibus, labio albo, inferne subcalloso, labro intus sulcato.*"

As no dimensions are given, this is somewhat unsatisfactory, but it applies much more to *T. australis*, than to any other. Mr. Angas's short diagnosis on the contrary, applies to *T. tæniata*. The specimens seen by me in the Museums of Melbourne, Sydney, Hobart Town, and Dr. Cox's extensive private collections, were all *var. tæniata*. Some obtained by Mr. Brazier, from Mr. Angas, were all young shells of *T. constricta*.

The conclusions I derive from these considerations, are—

1st. That we have commonly at most only three species of *Trochocochlea* on our shores, viz., *T. constricta*, *T. tæniata*, and *T. australis*.

2nd. That *T. constricta* and *T. tæniata* can only doubtfully be separated from one another.

3rd. That both these species are subject to great varieties of colour and form. *T. constricta* being the larger in Tasmania, and probably the smaller in South Australia, or else these being varieties of only one species, the smaller and larger varieties interchange their characters.

4th. That *T. striolata*, *T. concamerata*, and *T. porcata*, are all synonyms; the first two for *T. australis*, the last for *T. constricta*. Lam.

All these shells are distinguished by the lining of the upper whorls being non-nacreous, and of a beautiful malachite green. I noticed also in some places on the Tasmanian coast, a certain form intermediate between *T. c*, and *T. t.*, in which the whorls were very obtuse, the shell large and smooth, and painted in zig-zag lines of vivid bluish green, and white. The upper whorls and apex were much corroded, and of silvery nacre. This variety always flourished on modern basaltic rocks in Recherche Bay, and elsewhere, where no other mollusca seemed common, and often where the water was brackish. It was a large shell, and the keels are almost completely obsolete.

It is a remarkable fact, that the larger shells of these species are found in S. Tasmania, and they become smaller, more decidedly ornamented, and highly coloured as they approach the tropics.